NON-PUBLIC?: N
ACCESSION #: 9008140018
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Clinton Power Station PAGE: 1 OF 5

DOCKET NUMBER: 05000461

TITLE: Out-of-Calibration Generator Overvoltage/Hertz Relay Results in Relay Actuation Prior to Exceeding Design Setpoint Causing Main Turbine Generator Trip and Automatic Reactor Scram
EVENT DATE: 07/09/90 LER #: 90-013-00 REPORT DATE: 08/03/90

OTHER FACILITIES INVOLVED: None DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 091

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: P. D. Yocum, Director-Plant Operations, extension 3205

TELEPHONE: (217) 935-8881

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: EL COMPONENT: 59 MANUFACTURER: G080
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On July 9, 1990, with the plant in POWER OPERATION at 91 percent reactor power, main generator overvoltage/hertz protection relay 59/81-1 actuated. After a designed 45-second time delay, the main turbine generator tripped via turbine control valve fast closure which caused an automatic reactor scram. Additionally, Groups 2, 3, and 20 containment isolation valves actuated as a reactor vessel water low-level trip occurred. Investigation determined that relay 59/81-1 had actuated prior to exceeding its design setpoint because it was out of calibration. The cause of the relay being out of calibration cannot be determined. Probable causes are personnel error in reading the test instrument during calibration and/or test instrument error during calibration caused by a fluctuating voltage source. Corrective actions include: recalibrating

two relays and verifying setpoints of a sample of other relays calibrated during the same period; issuing detailed procedures for calibrating - protective voltage relays; investigating qualifying a Clinton Power Station technician to perform relay testing; recently purchasing new digital test equipment; and briefing each operations crew on generator limitations and abnormal voltages.

END OF ABSTRACT

DESCRIPTION OF EVENT

On July 9, 1990, the plant was in Mode 1 (POWER OPERATION). Throughout the morning, control room operators gradually raised main generator GEN! terminal voltage via the Alternating Current (AC) voltage regulator RG! in order to maintain a constant bus BU! voltage of 358 kilovolts and to compensate for system voltage dropping because of increased system load. This is normal operating practice.

At approximately 1058 hours, with the reactor RCT! at ninety-one percent of Rated Thermal Power (RTP), an Excessive Volt/Hertz annunciator ANN! was received in the control room. In response to the annunciator, the control room operator lowered generator voltage slightly in order to check the AC voltage regulator for proper operation. After a designed 45-second time delay, the main generator EL! overvoltage/hertz protection relay 59!, 59/81-1, actuated and caused a main turbine generator TG! trip and lockout. The main turbine generator trip and lockout caused a turbine trip via turbine control valve V! fast closure whic
in turn caused an automatic reactor scram.

Due to a normal-reactor vessel water level transient that immediately followed the reactor scram, a Reactor Vessel Water Low-Level (Level 3) trip occurred and resulted in activation of Groups 2 (Residual Heat Removal system BO! to upper containment pools), 3 (Residual Heat Removal shutdown cooling) and 20 (miscellaneous) containment isolation valves ISV!. The Reactor Vessel Water Low-Level trip was reset, and a Reactor Vessel Water High-Level (Level 8) trip occurred causing reactor feedwater SJ! pumps P! to trip. Operators verified automatic actions, and took immediate and subsequent actions in accordance with off-normal procedure 4100.01, "Reactor Scram."

The plant was stabilized in Mode 3 (HOT SHUTDOWN) with the Main Steam SB! Isolation Valves (MSIV) open. Reactor steam loads were reduced and reactor pressure was decreased to 600 pounds per square inch gauge in

accordance with integrated operating procedure 3006.01, "Unit Shutdown."

At approximately 1525 hours, operators completed the off-normal procedure checklist 4001.02C001, "Automatic Isolation Checklist," and verified that the Groups 2, 3, and 20 isolations had occurred as designed.

Maintenance Work Request (MWR) D09608 was initiated to investigate the apparent overvoltage/hertz trip of the main turbine generator.

No other automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. No other equipment or components were inoperable at the start of this event such that their inoperable condition contributed to this event.

CAUSE OF EVENT

The cause of this event is attributed to an out-of-calibration main generator overvoltage/hertz protection relay.

The out-of-calibration main generator overvoltage/hertz protection relay actuated and caused a main generator trip and lockout. The main generator trip caused a turbine trip via turbine control valve fast closure which resulted in an automatic scram. The reason for the relay being out of calibration cannot be determined; however, the most probable causes are: personnel error when calibrating the relay, such as misreading the analog test meter MTR!; test instrument error caused by a fluctuating voltage source resulting in the analog test meter fluctuating or reading inaccurately; or a combination of both.

Additionally, investigation of this event identified that Illinois Power (IP) non-Clinton Power Station (CPS) maintenance technicians performed the last calibration of these relays on March 10, 1990 in accordance with MWR D09100. The recorded as-left setpoint values, per MWR D09100, for relays 59/81-1 and 59/81-2 were 121 volts and 129.8 volts, respectively. The design setpoint value for relay 59/81-1 is 121 volts. The design setpoint value for relay 59/81-2 is 129 volts. However, the investigation found relay 59/81-1 set at 115.3 volts and relay 59/81-2 set at 125.5 volts. Review of MWR D09100 identified that it did not provide detailed job instructions nor reference the design specification, but instead relied on past history and technician expertise to perform the relay calibrations.

Both relays, 59/81-1 and 59/81-2, were recalibrated, trip tested with satisfactory results, and returned to service in accordance with MWR

D09608. However, to ensure-main generator overvoltage/hertz protection relay 59/81-1 is not subject to unnecessary actuation caused by setpoint drift, a temporary modification has been installed to remove the main generator trip associated with relay 59/81-1, but still provide annunciation of an overvoltage/hertz condition. This temporary modification will remain in place until the plant's second refueling outage, when both main generator overvoltage/hertz protection relays 59/81-1 and 59/81-2 will be checked to determine if setpoint drift has occurred. If no drift is apparent, the temporary modification will be removed. Main generator overvoltage/hertz protection relay 59/81-2 is installed with no modification.

CORRECTIVE ACTION

Overvoltage/hertz protection relays 59/81-1 and 59/81-2 were recalibrated and returned to service in accordance with MWR D09608. Additionally, a sample of four other voltage dependent relays calibrated during the sa|ne period under MWR D09100 were tested and found to be within specification.

Detailed procedures containing appropriate vendor test instructions, acceptance criteria, a space for comments, and detailed data sheets including documentation requirements for as-found and as-left settings will be written and issued for calibrating protective voltage relays. A plan and schedule for developing these procedures will be completed by October 31, 1990. Until the written procedures are issued, detailed preventive maintenance tasks and maintenance work requests will be written and used during calibration of these relays.

IP is investigating qualifying a CPS technician to perform relay testing.

IP has recently purchased new digital test equipment for use in calibrating protective voltage relays. This new test equipment should help eliminate instrument errors caused by voltage source fluctuations and personnel errors in reading the test equipment.

Each operations crew was briefed on generator limitations and abnormal voltages.

ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73(a)(2)(iv) due to automatic actuation of the Reactor Protection System JC! and actuation of Groups 2, 3, and 20 containment isolation valves.

Assessment of the safety consequences and implications of this event has determined that this event was not nuclear safety significant.

The main generator is equipped with a two-stage overvoltage/hertz protection design. These relays are in place to protect the main generator from damage caused by over-flux conditions. Excessive magnetic flux in the main generator can cause over-heating of metallic parts and, in extreme cases, localized rapid melting of generator core laminations. The first stage trip, main generator overvoltage/hertz protection relay 59/81-1, is designed to actuate at 110 percent of rated volts/hertz after a 45-second time delay in order to prevent over-excitation damage to the generator or bus-connected transformers XFMR!. The second stage trip, main generator overvoltage/hertz protection relay 59/81-2, is designed to actuate at 118 percent of rated volts/hertz after a two-second time delay. The time element is based upon the manufacturer's time versus temperature information at various over-excitation levels to prevent damage. The setpoints for main generator overvoltage/hertz protection relays are set at a value to protect the generator. In this case, the setpoint was more conservative than the value necessary to protect the generator. Additionally, the automatic reactor scram placed the plant in a safe condition.

ADDITIONAL INFORMATION

The overvoltage/hertz relay that was found out of calibration during this event is model number 12STV11A2A manufactured by General Electric.

No reportable events with a similar cause have occurred at Clinton Power Station.

For further information regarding this event, contact P. D. Yocum, Director - Plant Operations, at (217) 935-8881, extension 3205.

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ILLINOIS POWER COMPANY

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

August 3, 1990

10CFR50.73

Docket No. 50-461

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Clinton Power Station - Unit 1
Licensee Event Report No. 90-013-00

Dear Sir:

Please find enclosed Licensee Event Report No. 90-013-00: Out-of-Calibration Generator Overvoltage/Hertz Relay Results in Relay Actuation Prior to Exceeding Design Setpoint Causing Main Turbine Generator Trip and Automatic Reactor Scram. This report is being submitted in accordance with the requirements of 10CFR50.73.

Sincerely yours,

F. A.Spangenberg, III
Manager - Licensing and Safety
STH/alh

Enclosure

cc: NRC Resident Office
NRC Region III, Regional Administrator
INPO Records Center
Illinois Department of Nuclear Safety
NRC Clinton Licensing Project Manager

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